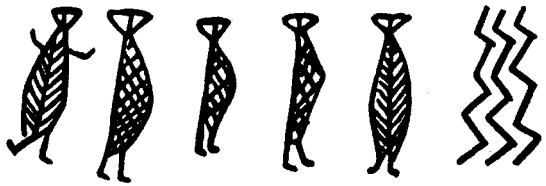
ISSN 0259–3458



Mesolithic Miscellany

May 1994

Volume 15 Number 1

Dating the early trapeze horizon. Radiocarbon dates from submerged settlements in Musholm Bay and Kalø Vig, Denmark

Anders Fischer

Danish National Forest and Nature Agency

For many years the early trapezes have been recognized as a topic of major culture–historical potential. They seem to occur in most parts of Europe, and further afield. They may have appeared more or less simultaneously in all regions of the continent. These chronological and distributional characteristics surely reflect efficient communication networks over long distances. Some scholars think they may represent one of the first waves of innovation radiating out from the Neolithic societies south-east of Mesolithic Europe. Any firm conclusions on these matters, however, have been hampered by a general lack of absolute dates for the earliest appearance of trapeze points in most parts of Europe.

In Denmark flint arrowheads of trapeze shape are found in large numbers. Most numerously represented in the excavated material are the rhombic and the narrow-oblique varieties (*Fig. 1*, O & P). In Peter Vang Petersen's (1984) model of typological evolution in the later half of the Mesolithic in north-east Denmark these two types are

In this issue . . .

characteristic of the 'early' and 'late' stages of the Kongemose Culture. These stages have been tentatively dated as 7500–7000 BP and 7000–6500 BP, respectively.

The cultural context and absolute date of the third and earliest type, the broad trapezes (*Fig. 1*, N), have until recently been rather uncertain. It has been known only from surface collections and from excavated assemblages of chronologically mixed nature.

Thus, until recently the absolute age and cultural affiliation of the broad trapezes from Denmark have not been known with any precision. A submarine settlement site from Musholm Bay off the west coast of Zealand, Denmark can now reduce this uncertainty.

Table 1 Radiocarbon dates from the Musholm Bay and Kalø Vig settlements. The dates have been calibrated using the CALIB 3.03 program.

	metres below sea level	*lab. no.*	*^{14}C age BP (uncalibrated)*	*calendar years BC ±1 s.d.*
Musholm Bay				
stump of alder	8.70	K-5916	7490±115	6420–6180
stump of alder	7.80	K-5915	7410±115	6380–6060
charred hazel nut	8.70	AAR-1573	7480±70	6390–6190
charcoal of hazel	8.70	AAR-1572	7320±70	6190–6040
Kalø Vig				
half a hazel nut	6.20	AAR-1177	7620±110	6530–6370
worked antler	6.10	AAR-1178	7390±160	6380–6020

The settlement in the submerged forest in Musholm Bay

The Musholm Bay site lies 8–9m below present sea level. It is only known from a surface collection in 1987 and a test excavation in 1988 (Fischer 1989). A thorough analysis of the find material has not been carried out yet, but from the data currently available the site appears to be a fairly large coastal settlement which was originally situated in a small sheltered bay close to the outlet of a larger river.

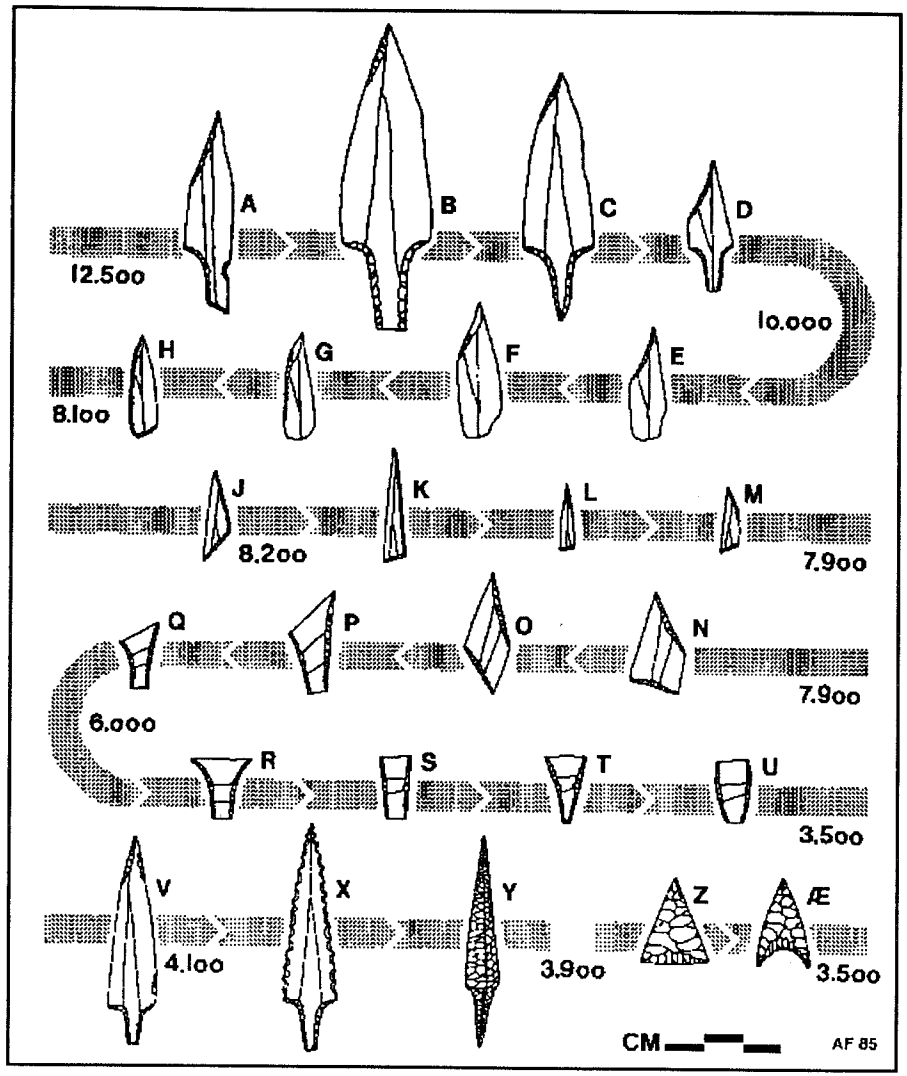


Figure 1 Typological evolution of flint points in Denmark. The different types are tentatively grouped into developmental sequences. ^{14}C dates are in uncalibrated years BP. The date 7900 now seems a couple of hundred years too early. From Fischer 1989*a* (drawn 1985).

Most of the assemblage seems to have been slightly displaced during the subsequent marine transgression. A reasonable quantity of organic remains (splinters of mammal bones, fragments of hazelnut shells, charcoal, etc.) were found, however, as were many stumps of trees standing rooted in the former habitation surface and as far down the slope as we have searched.

Tree stumps standing rooted at their original living place have shown up on many parts of the Danish sea floor. In the region around the Musholm Bay site we

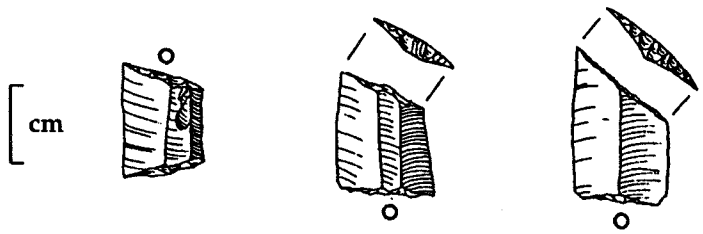


Figure 2 Broad trapeze points from the Musholm Bay site.

have examples from a depth of 30m and up to present sea level. These stumps probably represent trees that died as a result of the marine transgression when salt water penetrated their root systems. When they subsequently disappeared under the water and were buried beneath sediments, they were protected from further decay.

Two stumps from the site have been dated by ^{14}C analysis. One stump standing at depth of 8.70m was dated to 7490±115 BP and another from 7.80m below datum was dated to 7410±115 BP (*Table 1*). Thus the interpretation seems valid; these trees probably died subsequently as the sea rose. From other dated stumps, marine deposits and settlement structures of known depth at other sites in the region, it appears that the transgression of the Musholm Bay site was part of long lasting and relatively rapid sea-level rise which continued for more than a millennium after the submergence of the Musholm Bay settlement.

The top of the slope on which the habitation must have taken place lies 7.50m below the present water surface. This means that habitation was not possible at the site much later than the submergence of the above-mentioned tree standing at 7.80m below datum. The date of *ca* 7410 BP has for some years been the only fixed point for the absolute dating of the earliest trapezes in Denmark.

The first attempts at direct dating of cultural debris from the site were based on fragments of split mammal bone. These were preferred since they are undoubtedly cultural products and because their relatively high gravity makes it improbable

that they are brought in by the water from other, chronologically irrelevant sites. Regrettably, dating of these samples was not possible owing to low collagen content. Therefore, samples of less gravity, and hence generally less certain provenance, had to be used. A piece of charcoal from hazel and a fragment of a hazelnut shell affected by fire were selected for accelerator dating. These gave dates of 7320±70 BP and 7480±70 BP, respectively (*Table 1*).

The two accelerator dates are in good agreement with one another and with the dates on the tree stumps. Thus it is reasonable to conclude that the trapeze-producing habitation at the site took place around 7400 BP.

Typologically, the Musholm Bay site must be referred to the Kongemose Culture – *i.e.* having a blade industry dominated by large, elegant blades produced by soft percussion technique, large core axes of rhomboidal cross section, and broad arrow-points of trapeze shape (*Fig.* 2). Thus it is necessary to insert an additional

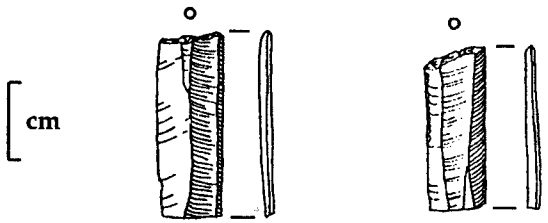


Figure 3 Triangular flint points from the Kalø Vig site.

chronological stage before the Villingebæk stage, which has until now been considered the earliest part of the Kongemose Culture. Consequently, the chronological range of the Villingebæk stage – previously given as as 7500–7000 BP (Vang Petersen 1984) – must be extended.

The submerged settlement in Kalø Vig

Musholm Bay may represent not just an early stage but the very earliest stage of the Kongemose Culture. This at least is the impression from a preliminary inspection of another submerged site on the Danish sea floor. The site in question is situated in Kalø Vig, off the east coast of Jutland. Its lithic assemblage is more Maglemosian in style than the Musholm Bay industry – the component of blades made by soft percussion technique includes a high proportion of elegant micro-

blades. Furthermore, the only two flint points found are of triangular shape (*Fig. 3*). Since the assemblage is so small it cannot be excluded that broad trapezes are in fact part of the industry – as in the assemblages from Ageröd mentioned below.

At the moment only two accelerator dates on cultural debris from the Kalø Vig site are available. The sample considered most reliable was taken from a gyttje sediment containing worked flint. It is half a hazelnut shell, possibly opened by man, and is dated to 7620±110 BP. The other is a surface-collected worked fragment of an antler tine (red deer or elk), dated to 7390±160 BP (*Table 1*). Thus, if the two flint points and the ^{14}C dates are representative of the typology and age of this site, the Maglemose Culture seems to have existed no more than a couple of hundred years prior to the Musholm Bay stage.

The inland assemblages from Ageröd

Based on some large, well-excavated assemblages from the rich lake-side settlement complex Ageröd I, Scania, southern Sweden, Lars Larsson (1978) has presented a number of broad trapezes as an integral part of the final Maglemose Culture.

The youngest non-trapeze-holding assemblage from Ageröd is the 'white layer'. It is an assemblage in late Maglemosian style with triangular flint points similar to the ones from Kalø Vig. The average of seven ^{14}C dates from this layer is 7680 BP, but the dated samples present problems in terms of contamination and perhaps also of redeposition of material from previous habitation episodes in the vicinity. Using only the two oldest, and apparently unproblematic, dates the assemblage should not be older than *ca* 7890 BP.

A culture layer including broad trapezes was found just on top of the 'white layer'. Cultural remains from this 'upper peat' have been dated to *ca* 7810 BP, *ca* 7770 BP and *ca* 7470 BP, but again there are problems of contamination and perhaps also provenance. The remaining two assemblages including broad trapezes (Ageröd I:B and I:D) are dated to *ca* 7990 BP and *ca* 7780 BP (excluding the more dubious dates).

The flint point component of the last-mentioned three assemblages includes narrow trapezes (*Fig. 1*, M) and scalene triangles of the kind known from Kalø Vig. Typologically, these three assemblages may be considered transitional Maglemosian–Kongemosian. Lars Larsson (1978) has preferred to classify them as belonging to the Maglemose Culture.

On the basis of the Ageröd I assemblage, Larsson states that the Maglemose Culture should be dated no later than *ca* 7900 BP. In the light of the results from the Danish sea floor mentioned above, and considering the problems of contamination and provenance of the Ageröd ^{14}C samples, this date may be too old. It now seems more likely that the transition from Maglemose to Kongemose Culture falls within the range 7900–7400 BP.

Conclusion

For many years the period including the latest Maglemose Culture and the earliest Kongemose Culture has been one of the major 'blank areas' of the otherwise relatively well-explored Danish Mesolithic chronology. This lack of clarity has resulted from a general lack of chronologically-homogenous assemblages datable by pollen or radiocarbon analyses from the inland areas.

It now appears that settlement assemblages from submerged coastal sites have the potential for bridging this chronological and typological hiatus. From preliminary inspections under water it appears that broad trapezes were in use around 7400 BP. Moreover, it seems likely that the introduction of this earliest type of trapeze-shaped flint point in southern Scandinavia occurred no more than a hundred years earlier. Whether the cultural context of this innovation is to be classified as very early Kongemosian or very late Maglemosian should perhaps wait until more is known of the typological evolution of the period.

Acknowledgements

Thanks are due to Claus Malmros and Kjeld Christensen of the Danish National Museum, Copenhagen for determination of wood species. I also wish to thank Uffe Rahbek and Kaare Lund Rasmussen of the ^{14}C Dating Laboratory in Copenhagen and Jan Heinemeier and Niels Rud from the AMS ^{14}C Dating Laboratory in Aarhus for dating and calibrating the samples. Kurt Petersen of the Museum of Kalundborg is thanked for drawing *Figures 2 & 3*.

References

Fischer, A. 1989*a*. Hunting with flint-tipped arrows: results and experiences from practical experiments. In Bonsall, C. (ed.), *The Mesolithic in Europe. Papers Presented at the Third International Symposium, Edinburgh 1985*. Edinburgh, John Donald:29–39.

Fischer, A. 1989*b*. Musholm Bay. Excavation of a submarine settlement in a drowned forest 9 meters below present sea level. *Mesolithic Miscellany* 10(2):1–3.

Larsson, L. 1978. *Ageröd I:B – Ageröd I:D. A Study of Early Atlantic Settlement in Scania*. Acta Archaeologica Lundensia Serie in 4°, No. 12. Lund, Gleerup.

Vang Petersen, P. 1984. Chronological and regional variation in the Late Mesolithic of eastern Denmark. *Journal of Danish Archaeology* 3:7–18.

Excavations in Ulva Cave, western Scotland 1990–91: a preliminary report

C. Bonsall, D.G. Sutherland, N.J. Russell, G. Coles, C.R.C. Paul, J.P. Huntley & T.J. Lawson

This is the third report to be published in *Mesolithic Miscellany* on the excavations in Ulva Cave. The previous two reports (Bonsall *et al.* 1991, 1992) were concerned with fieldwork carried out in 1987 and 1989. This report summarizes the results of fieldwork and post-excavation work in 1990 and 1991.

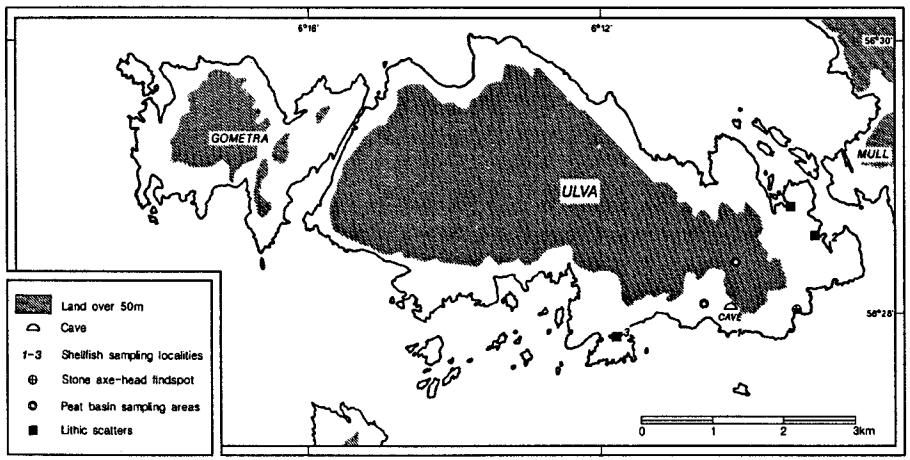


Figure 1 Map of the Isle of Ulva showing the locations of Ulva Cave, lithic scatters, pollen sites and modern shellfish sampling localities.

The fieldwork programme

The fieldwork programme had two main objectives: to begin archaeological and palaeoenvironmental surveys of the site locality, and to continue excavation of the post-glacial deposits within the cave.

Archaeological survey

A fieldwalking programme was initiated designed to locate open-air Mesolithic sites and to provide information on the availability of lithic raw materials on the island.

Beaches along the modern shoreline in the general vicinity of the cave were examined for pebbles of flint and similar materials. None were found, and no source of flint has yet been identified on the island. During the survey, however, a polished axe-head of basalt was picked up on the foreshore about a kilometre to the east of the cave at NM 441383.

Four lithic scatters were identified in the course of fieldwalking (*Fig. 1*), three along the shore of the Sound of Ulva – at Séilean Ruadh (NM 44083970), at NM 44303955, and near to Ulva House (NM 44333927) – and one at Caisteal Beag (NM 41463808) on the south coast of the island. All were located in the inter-tidal zone of small inlets, at or near stream mouths. A small series of artifacts was recovered from each locality, these consisting exclusively of débitage. The raw material is flint and a significant number of the pieces show signs of abrasion, suggesting that the material was not *in situ*. The collection from Caisteal Beag was examined by Mr M. Robinson as part an experimental study of abrasion of flint artifacts. His analysis suggests that the artifacts had been subjected to both stream and tidal abrasion, and may be derived from a site (or sites) up to 100m upstream (Robinson 1991).

Palaeoenvironmental investigations

In conjunction with the cave excavation, research is being undertaken to reconstruct the past environment of Ulva with particular reference to changes in sea level and human effects on vegetation development.

A geomorphological survey of the south east of the island was undertaken to establish: (1) the distribution of raised beaches and landscape features associated with high sea levels, and (2) the distribution of basins with lake or mire deposits from which long palynological records might reasonably be expected.

The survey identified four possible raised beaches: at around 40m, 20–25m, 10–15m and 2–5m above present mean sea level and in approximate agreement with similar features on Mull. Investigation of overlying sediments may enable these features, and hence changes in sea level and the relative disposition of land and sea, to be dated, and future work will be directed to this problem.

Of particular relevance to the chronology of sea-level change is an un-named valley mire lying 200m west of Ulva Cave (*Fig. 1*) which appears to have formed a

tidal inlet during the last (2–5m) phase of higher sea level. Two auger transects east–west and north–south across the site revealed a 7-metre deep sequence of shallow near-shore beach facies marine sands grading upwards into shallow lagoonal facies brackish marine silts with (possibly intertidal) peat deposits, these giving way to brackish and eventually freshwater peats. The entrance to this 'inlet' is blocked by a gravel spit the growth of which probably initiated lagoonal sedimentation and intertidal peat growth; falling sea level would have then enabled terrestrial peat growth.

Extensive coring was also carried out at the basin mire of Glac nan Ramh, 500m to the north of Ulva Cave and at 74m above OD (*Fig. 1*). The sedimentary sequence here had a maximum depth of 6.5m and appears to extend back into the Lateglacial. Sand and silt inwash bands suggest local vegetation disturbance at various times during the Holocene, and an initial palynological examination suggests that this sequence offers an excellent prospect for recovering a vegetation record of some detail. Few other basin mires were noted, although blanket peat is common. Overlapping 'Russian' cores were taken from suitable locations at both sites for palaeomagnetic, sedimentological and palynological analysis. Tephrochronology and radiometric dating techniques will be employed to anchor these sequences.

As a preliminary to investigations into the archaeozoology of the site, a number of studies of the modern fauna of Ulva were initiated in 1990. Dr S. Stallibrass (Durham University) carried out a preliminary investigation of the current mammalian fauna of the island together with topographical and ecological features of the landscape, Mrs A. Eastham conducted a field study of the modern avifauna, while Ms N.J. Russell (Edinburgh University) studied shore ecology and collected samples of shellfish from a variety of coastal habitats in order to create a reference collection for her study of the molluscan faunas from the cave (*Fig. 1*, 1–3). These studies have emphasized the variety of habitat niches available within the limited extent of the island. The island is particularly rich in vegetation suitable for large mammal species and also benefits from the presence of migrant species of birds throughout the year. It will be interesting to see if this broad environmental pattern is also present in the fossil record. It is notable that within the midden area of the cave, mammalian and avian remains continue to accumulate. The taphonomy of this modern assemblage will be compared with the archaeological material.

In addition to this general background research, samples limpet (*Patella* spp) and common periwinkle (*Littorina littorea*) were collected from various parts of the contemporary shore in the vicinity of the cave at approximate one-month intervals between March 1990 and May 1991. These will serve as modern control samples for seasonality studies of shells from archaeological contexts in the cave.

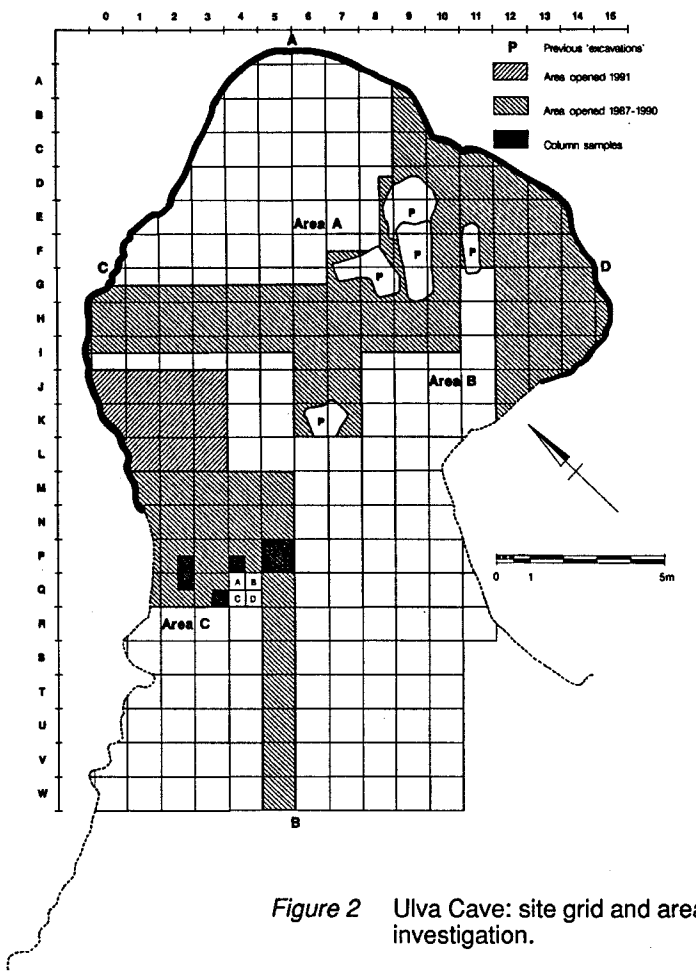


Figure 2 Ulva Cave: site grid and areas under investigation.

Excavation

Further work was undertaken in the cave interior (Areas A, B) and the entrance zone (Area C), bringing the total area under investigation to *ca* 97m² (*Fig. 2*).

Area A was extended horizontally as far as the south-west wall of the cave. The major feature uncovered in this area was an extensive deposit of ash (Context A26) up to 25cm thick, overlying a layer of large basalt stones. No radiometric dates are available yet for the ash layer, but its stratigraphic position suggests that it relates to post-Mesolithic occupation of the cave.

Area B was extended to expose the stone pavement (Context B34) over the entire north-east part of the cave interior.

Previous work in Area C had been confined to a single trench, 10m long x 1m wide, dug through the Mesolithic shell midden (Context C3) and into the underlying deposits to a maximum depth of 0.90 metres (Bonsall *et al.* 1992). In 1990 the excavation was extended into the area between this trench and the north-west wall of the cave (*Fig.* 2). The midden was exposed over an area of *ca* 16m^2 and was found to extend right up to the cave wall. The overlying talus deposits were variable in thickness and proved to be complex stratigraphically, posing considerable problems of excavation and recording. Flint artifacts and several sherds of pottery were recovered from contexts directly overlying the midden. Investigation of the midden to the north west of the initial sondage began in 1991. The excavation is based on a 50-cm grid (*Fig.* 2) and, in the absence of clear stratigraphic divisions within the midden, each grid square has been dug in arbitrary (horizontal) 5cm-thick 'spits'. Only material from the upper levels of the midden was excavated in 1991, the maximum number of spits removed from any grid square ranging from 0–5.

The post-excavation programme

Midden analysis

The method of excavation adopted effectively provided a series of column samples through the midden. With the help of undergraduate students from the University of Edinburgh the material from five 'columns' – one complete column, P5 (excavated in 1989) and four partial columns, P2D, P4C, Q2B and Q3D (excavated in 1991) – was sieved through a 2mm mesh and the residue hand sorted to isolate the major cultural components (*Table 1*).

Marine molluscs

A preliminary analysis of the marine shells in the column samples was undertaken by one of us (NJR), and has provided important data bearing on subsistence practices and environmental conditions associated with human use of Ulva Cave during the middle Holocene. The results of the analyses are discussed in detail in a paper presented at the international symposium on *Man and Sea in the Mesolithic*

Table 1 Overall composition of the midden samples analyzed.

Component	*Weight (g)*	*%*
Marine molluscs	97,526.2	38.88
Mammal bones/teeth	4,023.0	1.60
Antler	40.1	0.02
Fish bones	134.1	0.05
Fish otoliths	6.9	0.00
?Fish scales	0.1	0.00
Ray teeth	0.8	0.00
Crustacean remains	137.2	0.05
Barnacle plates	38.1	0.02
Land snails	1.9	0.00
Carbonized hazelnut shells	0.8	0.00
Carbonized seeds	2.3	0.00
Charcoal	109.3	0.04
Uncarbonized plant remains	27.0	0.01
Flint	169.6	0.07
Quartz	2.3	0.00
Pitchstone	0.8	0.00
Pottery	20.6	0.01
Beach pebbles	8,208.6	3.27
?Pumice	1.9	0.00
Slag	11.0	0.00
Glass	0.1	0.00
Stones	63,993.1	25.51
Sieving residue (>2mm)	36,775.3	14.66
Sieving residue (<2mm)	39,625.5	15.80
Total	**250,856.6**	**100.00**

held at Kalundborg, Denmark, in 1993 (Russell, Bonsall & Sutherland 1995). The main findings may be summarized as follows:

(1) twenty-two species of shellfish are represented in the midden, although three species – limpet (*Patella* spp.), periwinkle (*Littorina littorea*) and dogwhelk (*Nucella lapillus*) – dominate;

(2) limpets were the principal species exploited, and appear to have been collected from the lower and middle shore zones;

(3) a change in the ratio of limpets/periwinkles towards the top of the midden is interpreted to reflect a shift in collecting strategy; this change may have occurred around 6000 BP;

Table 2 Land snails recovered from a 1.75kg sample from the lowermost 5–10cm of the midden in grid square P5.

Species	*Number*	
Leiostyla anglica	63	
Discus rotundatus	46	
Clausilia bidentata	35	(15 fresh, 20 bleached)
Vitrea contracta	8	
Oxychilus sp.	6	
Aegopinella sp.	5	
Punctum pygmaeum	3	
Cepaea sp.	2	
Acanthinula aculeata	2	
Balea perversa	2	(1 fresh, 1 bleached)
Vertigo pusilla	1	
?Vertigo pygmaea	1	
Cochlicopa lubricella	1	
Euconulus sp.	1	
Total	**176**	(160 omitting fresh shells)

(4) processing methods are difficult to determine, but there is some evidence for deliberate breakage of dog-whelk shells, presumably to aid meat extraction;

(5) the shells of a some of the 'minor' species of marine molluscs, especially the blue-rayed limpet (*Helcion pellucidum*) were probably introduced to the site attached to seaweed;

(6) comparison of the shape characteristics of dog-whelk shells from the midden with those from the present shore suggests that the Mesolithic shoreline in the vicinity of the cave was more sheltered than that of the present day;

(7) one species, thick topshell (*Monodonta lineata*) occurs only in the lower levels of the midden; its absence from the most recent midden deposits and the present shoreline of Ulva may be related to climatic change since the mid-Holocene.

Non-marine molluscs

Land snails are found infrequently in archaeological horizons within caves (Evans 1978). In order to test for their presence in Ulva Cave, a 1.75 kg sample collected from the lowermost 5–10cm of the midden in grid square P5 was sent to Dr C. Paul (Liverpool University) for examination. This was washed through a 0.5mm mesh sieve, dried in an oven, and then passed through a nest of sieves with meshes at 4, 2, 1 and 0.5mm. All apices of snails were picked out and identified as far as possible. The results are presented in *Table* 2.

There are no specific cave-dwelling land snails in Britain. The fauna of at least 14 species is quite diverse and probably reflects the position of the sample near the mouth of the cave. However, the abundance (183 specimens per 2kg sediment, discounting fresh snails) is considerably less than typical samples from the middens on Oronsay (Paul 1987) and may well reflect the influence of the cave environment. It would be interesting to know if and how diversity and abundance change going into the cave. Fresh shells of *Clausilia* and *Balea*, which commonly crawl on rock surfaces, suggest contamination with recent shells even at the base of the midden. Nevertheless, fresh shells are recognizable so possible contamination can be taken into account.

All the faunal elements were found in the midden at Cnoc Coig, Oronsay, and all but three (*Leiostyla, Balea* and *Euconulus*) at Caisteal nan Gillean, Oronsay, but not in the same proportions. *Leiostyla,* in particular, was very rare in the Oronsay middens. Similarly, all species bar *Vertigo pusilla* were found alive on Oronsay and/or Colonsay (Paul 1976); so the Ulva Cave fauna is generally comparable to that from Oronsay. A thorough survey of the non-marine molluscs in Ulva Cave should yield useful palaeoenvironmental information.

Table 3 Carbonized cereal grains from pits in Ulva Cave.

Area	*Context*	*Unit*	*Type*	*Number of grains*
B	B8	1	Hulled barley (*Hordeum* sp.)	130
			Oats (*Avena* sp.)	*ca* 50
C	C47	–	Hulled barley (*Hordeum* sp.)	1 frag.
			Naked(?) barley	1 frag.
			Cereal (indet.)	2 frags

Table 4 Povisional list of lithic artifacts recovered from contexts in the entrance zone during excavations in 1989 and 1990. Material recovered during laboratory processing of midden samples is excluded from the table. Classification after Wickham-Jones (1990).

Type	*Supra-midden contexts*	*Midden*	*Sub-midden contexts*
CORES			
Platform	1	2	2
Bipolar	1	1	
Amorphous		1	
BLADES	2	1	5
FLAKES	7	142	33
MODIFIED ARTIFACTS			
Edge retouched	1		1
Scraper	1		
TOTAL	**13**	**147**	**41**

Plant macrofossils

Carbonized cereal grains were recovered from soil samples excavated from two pits – one (Context C47) in the entrance zone, the other (Context B8) in the interior of the cave. Initially, cereal grains were sorted by eye from small samples of sediment and a few examples of the different types of grains were sent to Mrs J.P. Huntley at the University of Durham for identification. Subsequently, bulk soil samples from Context B8 were sent to Mrs Huntley for laboratory processing. A provisional list of the material analyzed to date is given in *Table 3*.

Context B8 produced some extremely well-preserved oat and barley grains. At least some of these represent the cultivated 6-row variety, and this is confirmed by the presence of seven fragments of 6-row rachis. Among the remains of oats are two floret bases from the cultivated variety, *Avena sativa*. The cereal grains recorded so far were recovered from the upper part of the pit infilling (Context B8, unit 1). Charcoal from the base of the pit has been dated to 4990±60 BP (GU–2707). If some of the cereal grains are contemporary with the charcoal, this is an extremely early date for cultivated oats which, on evidence from Scottish sites analyzed previously, only appeared during the Iron Age. The cereals from this pit are therefore of great potential interest. Larger quantities of sediment from the various archaeological features within the cave will be bulk processed to 500 microns in order to increase the numbers of grains and possibly isolate weeds and cereal chaff fragments. AMS ^{14}C dating of individual cereal grains will also be undertaken.

Lithic artifacts

The majority of artifacts found so far are of flaked stone, and nearly all of these have been recovered from contexts in the entrance zone (Area C). In nearly all cases the raw material is flint, although a few worked pieces of quartz, pitchstone and ?bloodstone have also been recovered. A basic typological classification of the artifacts from entrance zone contexts in 1989 and 1990 is given in *Table 4*.

Dr W. Finlayson (Edinburgh University) examined a sample of the flint artifacts for use-wear in order to assess their potential for functional analysis. Of 21 pieces examined, five (including two edge-retouched pieces) were found to have clear traces of use. These initial results are encouraging and suggest that a full-scale functional analysis will yield useful information on the nature of the activities undertaken in the cave.

Pottery

Five sherds were recovered during the initial investigation of the entrance zone deposits in 1989. The sherds are similar in colour and fabric, and in this sense form a coherent group. The three largest pieces derive from contexts which clearly

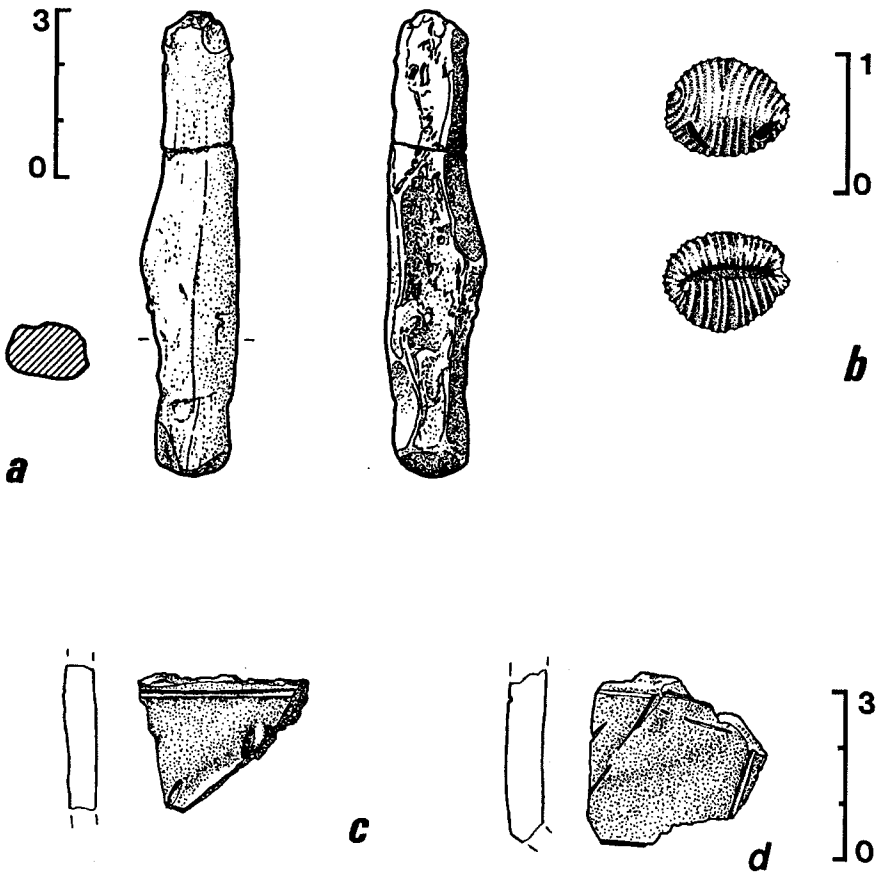


Figure 3 Non-lithic artifacts from Ulva Cave: ***a*** bevel-ended tool; ***b*** cowrie shell 'bead'; ***c***, ***d*** pottery.

postdate the midden: two sherds – one with incised decoration (Fig. 3*c*) – were recovered from the infilling of a hollow or pit (Context C47) cut into the midden; a second decorated sherd (Fig. 3*d*) was recovered from a thin layer of talus (Context C80) directly overlying the midden. The two remaining fragments were found

during the sieving of bulk samples of midden material excavated in 1989 and could derive either from the body of the midden near its inner edge or from its surface. The sherds were examined and reported on by Dr Ian Armit (Historic Scotland). He regards them as having typological affiliations with the Hebridean and Unstan pottery styles of the western Scottish Early Neolithic, and observes that the sherd illustrated as Fig. 3*c*, in particular, closely resembles in decorative motif and fabric the Unstan Ware from sites like Eilean Domhnuill, Loch Olabhat, on North Uist (Armit 1987).

Table 4 Radiocarbon determinations. The errors are expressed at the ± 1σ level of confidence. Dates on marine shell are 'adjusted' for the marine reservoir effect.

Lab. Ref.	*Context*	*Material*	*^{14}C Age BP*
GU-2600	Area C: basal 5-10cm of midden	Shells of *Patella* spp. (inner fraction)	7660±70
GU-2602	Area C: top 10cm of midden	Shells of *Patella* spp. (inner fraction)	5690±70
OxA-3738	Area C: bevel-ended implement ('limpet scoop') from upper part of midden	Red deer antler	5750±70
GU-2704	Area A: lowermost Holocene deposit, infilling hollow in Pleistocene sub-surface	Humic acid fraction of black soil containing marine shells	7800±160
GU-2707	Area B: lower infilling of pit containing charcoal, carbonized cereal grains, and degraded marine shells	Charcoal (bulk sample)	4990±60
GU-2706	Area A: burnt horizon near top of Holocene sequence	Partially carbonized animal dung and charcoal	200±50

Further work in 1990 and 1991 led to the recovery of another thirty sherds and some smaller fragments. Of these, 26 sherds came from the top of the midden or the overlying talus deposits; the remaining four sherds were found in Area B between or beneath the stones of Context B34 ('stone pavement').

Other artifacts

Other artifacts recovered from the midden include a bevel-ended tool ('limpet scoop') of red deer antler (Fig. 3*a*), a perforated cowrie (*Trivia monacha*) shell (Fig. 3*b*) and several fragments of the shells of scallops (*Pecten maximus*) that were probably collected empty on the sea shore. In addition, a small bone point was recovered from Area B. These artifacts can all be paralleled by finds from Mesolithic ('Obanian') shell middens elsewhere in western Scotland.

Radiocarbon dating

A further four samples were submitted for radiocarbon assay, bringing the total number of dates so far to six (*Table 4*). Two dates are of particular significance: 7800±160 BP (GU-2704) for the humic acid fraction of an organic-rich layer (Context A43) in Area A, and 4990±60 BP (GU-2707) for a bulk sample of charcoal from a pit (Context B8) in Area B containing burnt bone, shell, and carbonized cereal grains. GU-2704 dates the earliest remains of Postglacial occupation in Area A and is indistinguishable at the 1σ level from the date of 7660±60 BP (GU-2600) for the base of the midden (Bonsall *et al.* 1992:10). GU-2707 demonstrates early Neolithic use of the cave, and accords with the presence of Unstan Ware in a post-midden context in the entrance zone; it also provides a *terminus post quem* for the construction of the stone pavement (Context B34) which sealed the pit.

Postscript

Fieldwork on Ulva was temporarily suspended at the end of the 1991 season, to enable the principal investigator (CB) to undertake rescue excavations and survey work in the Oban area. It is hoped that investigation of the cave will be resumed in 1996.

Acknowledgements

The fieldwork on Ulva in 1990 and 1991 was undertaken with the help of undergraduate students from the University of Edinburgh, and supported by grants from the British Academy, the Carnegie Trust, the Royal Archaeological Institute, the Society of Antiquaries of London, the Society of Antiquaries of Scotland, and the University of Edinburgh Department of Archaeology Fieldwork and Research Fund. The British Academy also gave a grant for post-excavation work. Permission to excavate was kindly granted by the landowners, Mrs J.M. Howard and Mr J. Howard. As ever we are grateful to the residents of Ulva for their continuing assistance and cooperation, and especially Anne and Ted Jones for their help in gathering modern shellfish samples.

References

Armit, I. 1987. *Excavation of a Neolithic Island Settlement in Loch Olabhat, North Uist, 1987* (Department of Archaeology Project Paper No. 8) Edinburgh, University Department of Archaeology.

Bonsall, C., D.G. Sutherland, & T.J. Lawson 1991. Excavations in Ulva Cave, western Scotland 1987: a preliminary report. *Mesolithic Miscellany* 12(2):18–23.

Bonsall, C., D.G. Sutherland, T.J.Lawson & N.J. Russell 1992. Excavations in Ulva Cave, western Scotland 1989: a preliminary report. *Mesolithic Miscellany* 13(1):7–13.

Evans, J.G. 1978. *An Introduction to Environmental Archaeology.* London, Paul Elek.

Paul, C.R.C. 1976. The non-marine Mollusca of Colonsay and Oronsay. *Journal of Conchology* 29:107–110.

Paul, C.R.C. 1987. Land-snail assemblages from the shell-midden sites. Chapter 6 in P.A. Mellars, *Excavations on Oronsay. Prehistoric Human Ecology on a Small Island.* Edinburgh, University Press:91–107.

Robinson, M. 1991. *The Abrasion of River-derived Flint Artifacts: an experimental study.* Unpublished MA dissertation, University of Edinburgh Department of Archaeology.

Russell, N.J., C. Bonsall & D.G. Sutherland 1995. The exploitation of marine molluscs in the Mesolithic of western Scotland: evidence from Ulva Cave, Inner Hebrides. In A. Fischer (ed.), *Man and Sea in the Mesolithic. Coastal Settlement Above and Below the Present Sea Level.* Oxford, Oxbow Books. In press.

Wickham-Jones, C.R. 1990. *Rhum. Mesolithic and Later Sites at Kinloch. Excavations1984–86* (Society of Antiquaries of Scotland Monograph no. 7). Edinburgh, Society of Antiquaries of Scotland.

Contributors

C. Bonsall	*Department of Archaeology, University of Edinburgh*
N. Russell	*Department of Archaeology, University of Edinburgh*
G. Coles	*Department of Archaeology, University of Edinburgh*
D.G. Sutherland	*Placer Analysis Ltd, 2 London Street, Edinburgh*
C. Paul	*Department of Geology, University of Liverpool*
J.P. Huntley	*Department of Archaeology, University of Durham*
T.J. Lawson	*12 Bonaly Grove, Edinburgh*

Barmosen I – continued . . .

Ole Grøn

National Museum of Denmark
Centre for Maritime Archaeology

In *Mesolithic Miscellany* vol. 14(1–2), Blankholm affirms that his original statement, 'Most of the area west of the x=6 grid line was excavated in 1 x 1m or 1 x 0.5m units, whereas most of the eastern part of the site was dug in 0.25 x 0.25m units' (Blankholm 1991:184, 186) is 'consistent with the actual situation' apart from a (repeated) typing error (0.25 x 0.25m units should have been 0.25m^2 units). He states correctly that *ca* 58% of the area to the west of the x=6 grid line was excavated in 1 x 1m or smaller units. Meanwhile this implies that the remaining *ca* 42% of the area west of the x=6 grid line was excavated in units larger than 1m^2 (1 x 2m or 2 x 2m units). That a major part (69%) of the lithic material was located to the west of the x=6 grid line and that most of this (81%) was registered in squares with at least one side measuring 2m, demonstrates that Blankholm's second statement is not only incorrect but directly misleading. That some of the large squares were separated into smaller ones during the excavation has been taken into account. The positions of *ca* 50% of the artifacts were registered by the squares they were found in. To carry out a detailed distributional analysis on such a basis is hazardous. The distribution of lithic waste is shown in *Figs 1 & 2*, the former with the material registered in regular squares, the latter with material registered in more irregular squares and in the N–S profile.

With regard to the name 'Baremose I' in the title of my paper (Grøn 1993) I guess that some kind person tried to amend what he/she thought was incorrect spelling when the paper was edited. The name is confusingly close to the Swedish 'Bare Mosse' (mesolithic sites in Scania). My copy of the original manuscript at least says 'Barmosen I'.

References

Blankholm, H.P. 1994. Barmose I revisited. *Mesolithic Miscellany* 14(1–2):12–14.

Blankholm, H.P. 1991. *Intrasite Spatial Analysis in Theory and Practice.* Aarhus, University Press.

Grøn, O. 1993. Some comments on the interpretation of Baremose I. *Mesolithic Miscellany* 13(2):12.

Johansson, A.D. 1971. Barmose–gruppen. Præboreale bopladsfund med skiveøkser i Sydsjælland. *Historisk Samfund for Præstø Amt. Aarbog* 1968:101–170.

Johansson, A.D. 1990. *Barmosegruppen. Præboreale bopladsfund i Sydsjælland.* Aarhus, University Press.

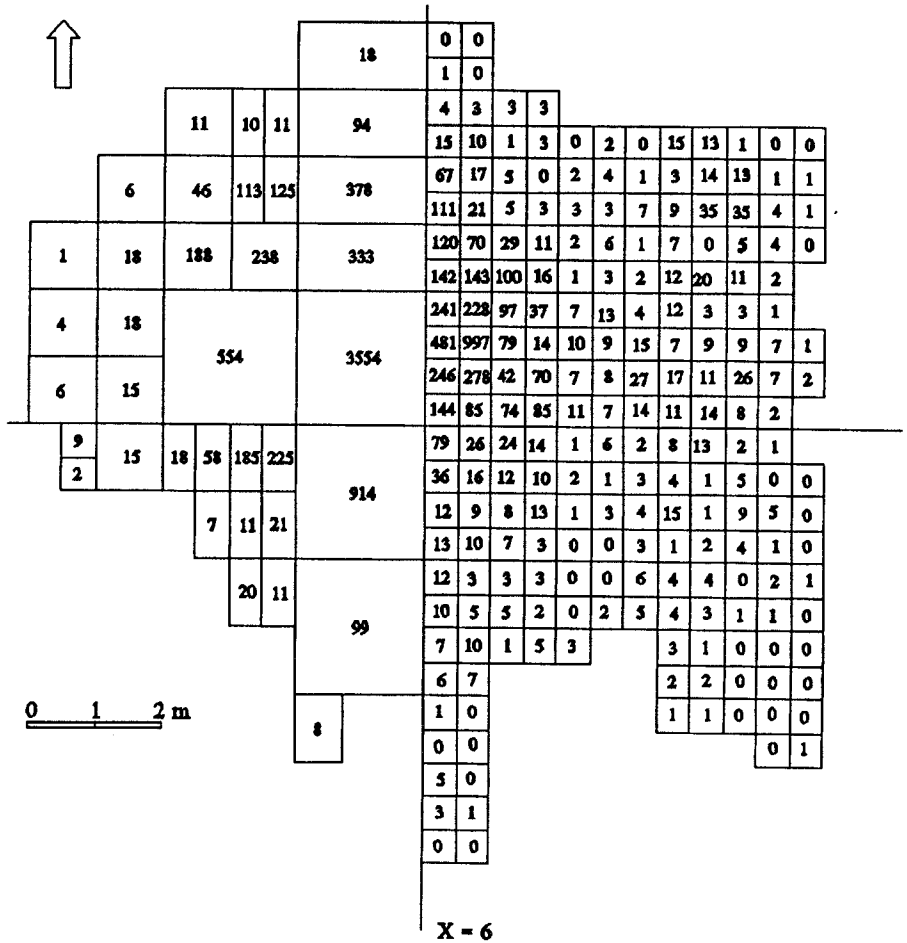


Figure 1 Distribution of lithic waste in regular grid squares.

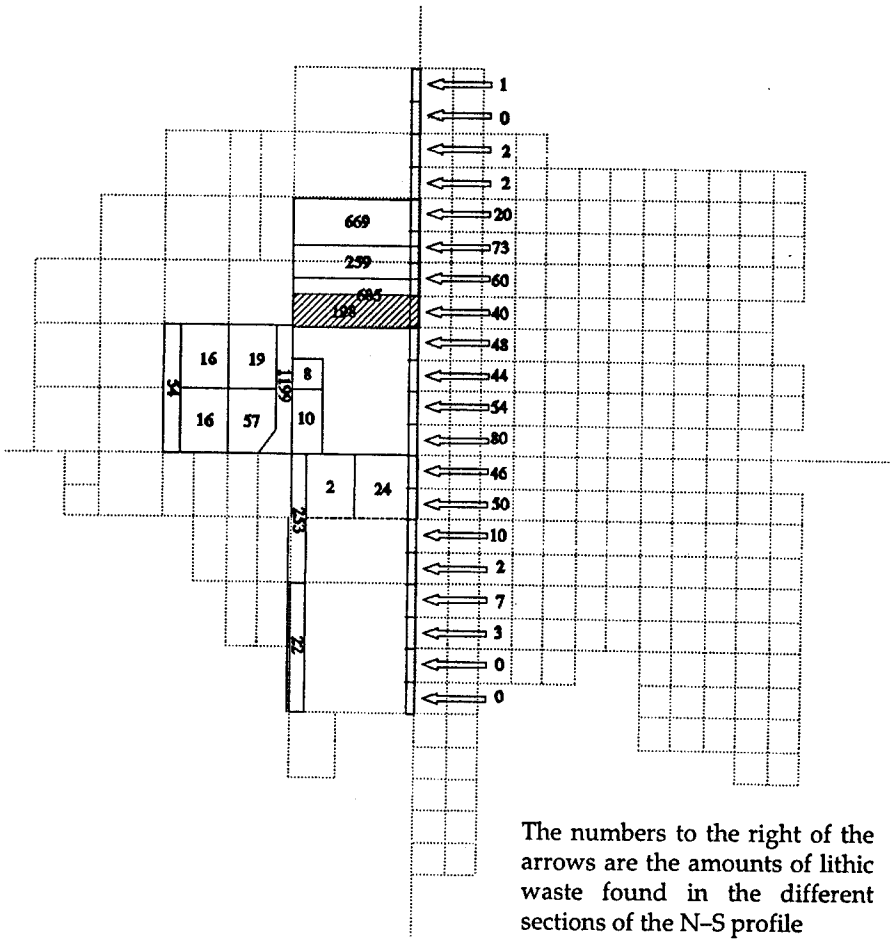


Figure 2 Distribution of lithic waste in irregular grid squares and the N–S profile.

Man and Sea in the Mesolithic

Anders Fischer
The Danish Forest and Nature Agency

Publication of the papers presented at the international symposium *Man and Sea in the Mesolithic — Coastal Settlement Above and Below Present Sea Level* is now well advanced. The editor has received over 40 papers dealing with foraging coastal adaptations and Mesolithic environments in many parts of the world. The authors are zoologists, geologists and, of course, archaeologists.

Among the topics dealt with in many of the papers and debated in detail in several individual contributions are: (1) shoreline displacement consequent upon rising sea level and land uplift; (2) fishing equipment and techniques; (3) zooarchaeological evidence of man's use of marine resources; (4) topographical models for predicting the location of coastal sites; (5) social characteristics of Mesolithic coastal societies; (6) interaction between coast and inland; and (7) legislation and Mesolithic sites.

A dominant topic of most contributions is the dramatic rise in world sea level which during much of the Mesolithic steadily drowned hunting grounds and settlements, and forced man to adapt to new territories and environments.

The book presents some of the first and very rewarding attempts at finding, excavating and protecting submerged settlements in the North Sea and on the south Scandinavian sea floor.

Most papers deal with the archaeology of Mesolithic sites above present sea level. In this case Scotland, Norway, Sweden, Estonia and Lithuania are of special interest owing to the fact that in those countries land uplift has raised Mesolithic coastlines and settlements above present sea level. A number of regional studies from these north European countries present an immense data-base — hitherto virtually unknown to the international audience — and document the importance of coastal habitation all the way back to the initial peopling of these regions during the Lateglacial.

Regional studies are also presented from Southwest Europe, Siberia, Japan, Northwest and Northeast America, and Greenland.

At the moment all contributors have received a first response from the Editor, and the layout of nearly half of the papers is done. If the rest of the editing, proof

reading and layout goes as efficiently as hitherto, the book can be expected to appear in the first half of 1995.

The Symposium proceedings will be published in English by Oxbow Books in cooperation with the Danish Forest and Nature Agency. It will contain 46 richly illustrated papers totalling 350 pages in A4 format, Hard Cover. Distribution by Oxbow Books, Park End Place, Oxford OX1 1HN, United Kingdom.

There is a Pre-publication Offer of £28, plus postage (see leaflet enclosed). The full publication price will be around £40 — given a successful pre-publication sale.

LIST OF CONTENTS

Grigoriy M. Burov Exploitation of marine resources during the prehistoric period in the Crimea, Ukraine.

Japan and North America

Akira Matsui Postglacial hunter-gatherers in the Japanese archipelago: maritime adaptations.

David Sanger Mesolithic maritime adaptations: the view from North America.

Vladimir V. Pitul'ko High Arctic Mesolithic culture: man and environment.

Morten Meldgaard Resource pulses in a marine environment. A case study from Disko Bugt, West Greenland.

South Scandinavia below present sea level

Anders Fischer An entrance to the Mesolithic world below the ocean. Status on ten years' work on the Danish sea floor.

Torben Malm Finding and excavating submerged Stone Age sites in Denmark.

Jørgen Skaarup Hunting the hunters and fishers of the Mesolithic – twenty years of research on the sea bottom south of Funen, Denmark.

Ole Grøn Research in Stone Age sites at submerged shore zones. Strategies and experiences.

Lars Hansen Submerged Mesolithic landscapes. Preliminary results from the Hanö Bay, Southern Baltic.

Carsten Lund Legislation, protection and management of underwater cultural heritage – the Danish model.

Discussants' comments and conclusions

Marek Zvelebil A final word on 'Man and Sea in the Mesolithic' – good news for women?

T. Douglas Price Some perspectives on prehistoric coastal adaptations and those who study them.

Peter Vang Petersen Sea and coastline: shoreline displacement, land rebound, salinity variations and tidal amplitude – local examples in a global perspective.

Lars Larsson Settlement along the north western Atlantic.

Sheila Coulson East and West Sweden: Areas dominated by land rebound – economy, topography, origin of coastal settlement and coast–inland relations.

Heikki Matiskainen Coastal adaptation in the East Baltic countries.

Epilogue

Anders Fischer Epilogue to the Man & Sea Symposium.